

CLAIMS

1. A method for transmitting data in a linear-type or ring-type network structured by a plurality of nodes and two-way transmission lines each connecting  
5 between adjacent nodes;

wherein each node operates as a left terminal equipment, a right terminal equipment, or an intermediate equipment; the left and right terminal equipments prepare token packets each including a  
10 transmission right and packet trailers including data packet storage area; the left terminal equipment transmits the packet trailers on a right direction line of the two-way transmission line; and the right terminal equipment transmits the packet trailers on a left  
15 direction line of the two-way transmission line;

wherein, when a request for transmission for transmitting data packets to the right direction is generated, each intermediate equipment writes the request for transmission in the token packet of the  
20 packet trailer on the left direction line; and when the request for transmission for transmitting data packets to the left direction is generated, each intermediate equipment writes the request for transmission in the token packet of the packet trailer on the right  
25 direction line; and each intermediate equipment performs the request for transmission;

wherein the left and right terminal equipments prepare the packet trailer having data packet storage area to ensure a reservation area for the  
30 intermediate equipment which transmitted the request for transmission, based on the request for transmission of the each intermediate equipment which is written in the token packet of the packet trailer transmitted from the opposite terminal equipment; and

35 wherein intermediate equipment which performed the request for transmission temporarily stores the data packet in the reservation area of the

packet trailer, and transmits the data packet to a destination node.

2. A transmission apparatus provided in each of a plurality of nodes which are connected through two-way lines in a linear-type or ring-type network;

wherein the transmission apparatus in each node comprises a function to operate as either a terminal equipment or an intermediate equipment;

wherein the transmission apparatus comprises means for preparing packet trailers each having a storage area to store token packets and data packets and for transmitting the packet trailers on the two-way transmission line when the transmission apparatus operates as a terminal equipment, and means for receiving the packet trailers transmitted from the opposite terminal equipment and delivered on the two-way transmission line and for terminating the packet trailers; further, the transmission apparatus comprises means for storing a transmission right in the token packet, in which the transmission right is applied to the intermediate equipment which performed the request for transmission, based on a request for transmission of each intermediate equipment written in the packet trailer transmitted from the opposite terminal equipment on the way of delivery, and for transmitting the packet trailers including the token packets having the transmission right to the opposite terminal equipment; and

wherein the transmission apparatus further comprises means for writing the request for transmission in the token packet of the packet trailer directed to the direction opposite to the data transmitting direction, when the transmission apparatus operates as the intermediate equipment, and when the request for transmission of the data packet is generated; and means for storing the transmission data in the packet trailer in accordance with the

transmission right of the token packet including in the packet trailer directed to the same direction as the data transmission, and for transmitting the data packet to the node of destination.

5           3. A transmission apparatus as claimed in claim 2, further comprising;

              means for detecting abnormal reception of data frames transmitted from the two-way transmission line and abnormal transmission in its own apparatus;

10           means for switching the apparatus to an equipment operating as the terminal equipment when data frames are not received from the apparatus of an adjacent node, and for transmitting a terminal-reminding frame to the apparatus of the adjacent node in order to request operation as the terminal equipment; and

15           means for determining whether the apparatus operates as either the terminal equipment or the intermediate equipment, based on a terminal-informing data frame informed from the apparatus transmitted from another node, and the terminal-reminding frame.

              4. A transmission apparatus as claimed in claim 2, further comprising;

25           means for writing an address of its own node in the packet trailer delivered on the two-way transmission line; and

              means for reading other node addresses written by other nodes from the packet trailers delivered on the two-way transmission line and for recognizing an arrangement of nodes at the left and right directions, based on other node addresses.

              5. A transmission apparatus as claimed in claim 2, further comprising;

35           means for preparing a plurality of independent packet trailers each including the token packet when the apparatus operates as the terminal equipment, and for transmitting the packet trailer which

ensured a reservation area for the intermediate equipment which performed a request for transmission; and

5 means for storing the transmission data in the reservation area in accordance with assignment of reservation based on the transmission right in the token packet and transmitting the data.

6. A transmission apparatus as claimed in claim 5, further comprising; means for storing the  
10 transmission data in a vacant area when the apparatus operates as the intermediate equipment, and when there is the vacant area in the packet trailer at the direction of data transmission, and for releasing the reservation area when the packet trailer having the  
15 reservation area assigned in accordance with the transmission right, and when there are no remaining transmission data.

7. A transmission apparatus as claimed in claim 2, further comprising; means for writing the  
20 transmission data adding a priority order when the apparatus operates as the intermediate equipment, and when the request for transmission is written in the token packet, and means for mediating the transmission right based on the priority order of the transmission  
25 data.

8. A transmission apparatus as claimed in claim 6, wherein, when the apparatus operates as the intermediate equipment, and when there is a vacant area in the packet trailer at the direction of the data  
30 transmission, the transmission data is sequentially written from a head position of the vacant area.

9. A transmission apparatus as claimed in claim 6, wherein when the apparatus operates as the intermediate equipment and receives the data for its own  
35 apparatus, the packet trailer is transmitted to the apparatus of the next node as the vacant area of the packet trailer in which the data was stored.

10. A transmission apparatus as claimed in claim  
2, further comprising a terminal interface unit having  
an interface function for the terminal equipment which  
communicates the data, and the terminal interface unit  
5 includes a buffer memory for adjusting an output timing  
of the transmission data to the network.

11. A transmission apparatus as claimed in claim 10, further comprising a terminal interface unit having an interface function for the terminal equipment which communicates the data, and the terminal interface unit includes a buffer memory for adjusting an output timing of the transmission data to the network.